MARINE REVIEW.

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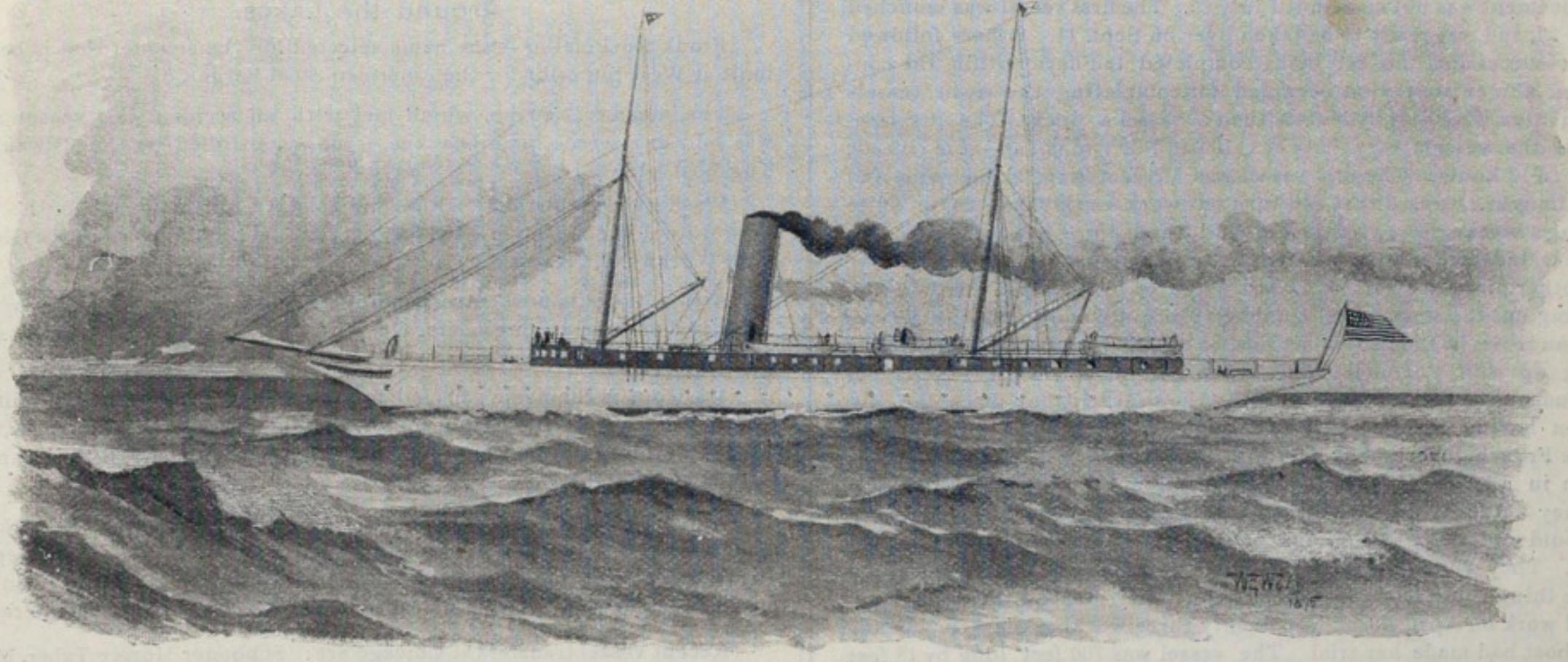
A $200,000 Steel Steam Yacht.

A steel steam yacht 225 feet over all has been framed and plated in just six weeks at the Crescent ship yard, Elizabethport, N. J. This is the establishment of which Louis Nixon, who was superintending constructor with the Cramps, is now manager. The yacht, which will be one of the finest in this country, costing $200,000, is named Josephine, and is being built for Peter A. B. Widener of Philadelphia, who is preparing for a trip with his family around the world. Her principal dimensions are: Length over all, 225 feet; on load water line, 183 feet; beam, 28 feet; depth, 15 feet; draft, 11 feet 6 inches; displacement, 800 tons. A steel house on deck, which will be covered with mahogany, is 135 feet long and 18 feet wide. The yacht will have a freeboard of 13 feet. She has very fine lines forward, but these are associated with a long overhanging bow and great flare, so that she will not bury herself in a seaway. The bilge is full round and the general shape seems to be snch that she will roll but little in heavy weather. A promenade deck on top of the deck house is intended especially for comfort while cruising in the tropics. Double awnings fore-and-aft will protect this house deck from the sun's heat. A bridge will extend across the pilot house the entire width of the vessel. In the extreme forward part of the deck house is the pilot house, chart room and captain's cabin, and also a special state room. Aft of this comes the galleys, a laundry and barber shop. The engine room comes next, and then the dining room, which extends the whole width of the deck house and which will seat twenty-four persons. The dining room is to be finished in oak, mahogany and walnut. The extreme after end of the deck house, occupied by the owner's apartments, will be finished in mahogany and fitted with brass bedsteads, wardrobes, desks, etc. Below these are to be ten large staterooms and a ladies' saloon finished in white and gold, with onyx mantel and other costly furnishings. Officers' quarters will be forward of the boiler and machinery compartment.

Engines are to be of the triple expansion kind, with cylinders 18, 27 and 42 inches diameter and 28 inches stroke of piston. Steam will be furnished by two Scotch boilers, built to withstand 175 pounds steam pressure. It is expected that the engines will develop 1,250 horse power. An electric plant that is to be installed in the vessel will be capable of operating fifty 16-candle power lamps, including a cable of lights that will be stretched over the mast head on special occasions. An Edison marine search light and refrigerating plant are other features of the yacht. Coal will all be stored in one large compartment, which will hold 210 tons and which will be located between boiler and engine spaces. This coal bunker occupies the entire width of the ship, and has outlets or doors directly on the fire-room floor, and being located amidships the trim of the yacht forward and aft will not be affected as the coal is used up. The boat equipment of the vessel will include a steam launch 30 feet long, a 21-foot naphtha launch, a whale boat 20 feet long, a 25-foot gig and a 16-foot dingy.



A $200,000 STEEL STEAM YACHT.

Steel Rails in 1896.

In one important branch of the iron industry the out-look is rather better than is generally suspected. It is estimated by good authority that in the aggregrate the orders for steel rails on the books of the mills figure up between 250,000 and 300,000 tons. This is a good showing when the fact is borne in mind that the mills delivered about 1,100,000 tons in all of standard rails in 1895. Thus far some important groups of railroads have placed their requirements, but a good many must still be heard from. Aside from the 18,000-ton Pacific coast order, which was placed several days ago, there has been nothing to speak of from new roads. With fairly good earnings, 1896 ought to be a much better rail year than was 1895. A few hundred thousand tons more going into that channel would do much to steady the situation.—Iron Age.

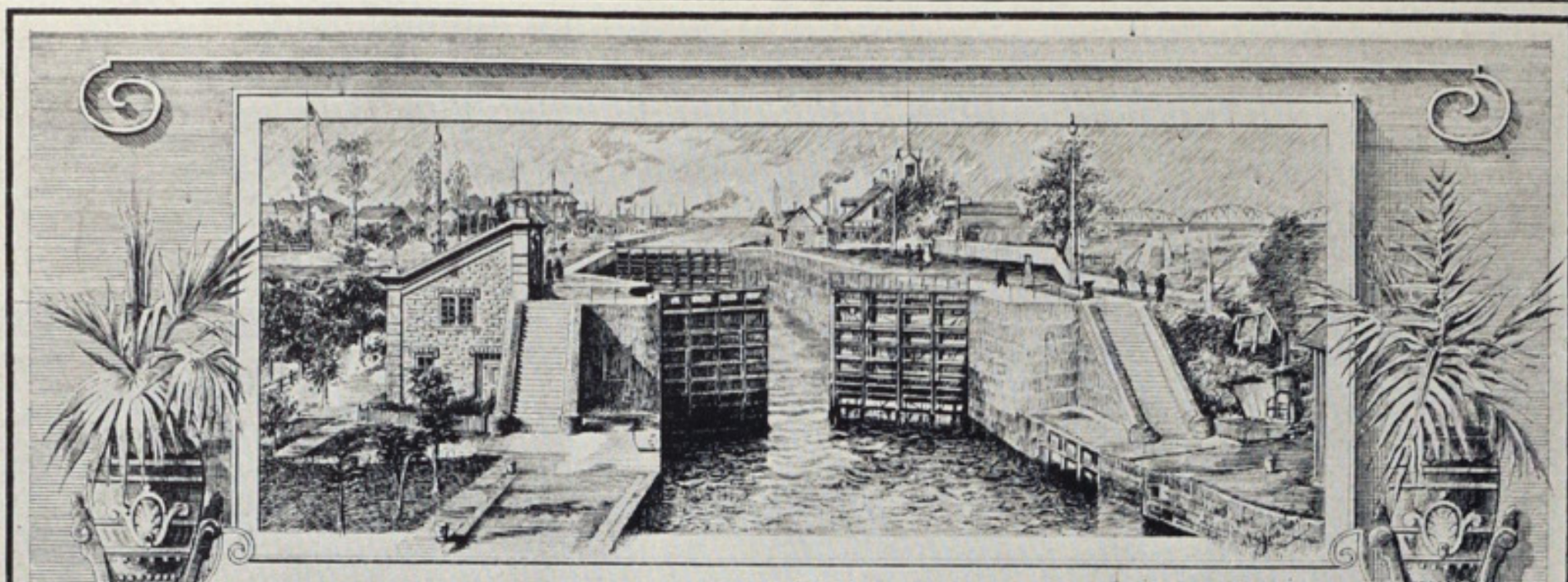
Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on Feb. 8, 1896:

	Wheat, bushels.	Corn, bushels.
Chicago	20,932,000	3,431,000
Duluth	9,914,000	73,000
Milwaukee	416,000	2,000
Detroit	296,000	28,000
Toledo	759,000	527,000
Buffalo	2,456,000	107,000
Total	34,773,000	4,168,000

As compared with a week ago, the above figures show at the several points named an increase of 329,000 bushels of wheat and a decrease of 314,000 bushels of corn.

On Feb. 8, there was afloat at Chicago 138,000 bushels of wheat, 3,221,000 bushels of corn and 227,000 bushels of oats; at Buffalo, 259,000 bushels of wheat, 223,000 bushels of oats and 250,000 bushels of barley; at Duluth, 512,000 bushels of wheat; and at Milwaukee 176,000 bushels of wheat and 120,000 bushels of oats.



RESOLUTIONS

adopted by the

EXECUTIVE COMMITTEE

OF THE

LAKE CARRIERS' ASSOCIATION

at a meeting held the Third day of October A. D. 1895, at Cleveland, the meeting being also largely attended by Vessel owners and others interested in the Lake trade.

Resolved,

That in the death of

General O. M. Poe,

the Lake interests have sustained a great loss.

After a distinguished career in active service during time of war, he devoted his great talents and energies to the accomplishment of yet greater achievements in advancing the internal commerce of his country.

For many years in charge of the principal works of government improvement on Lake Channels, he not only kept pace with the march of events but was ever in advance, anticipating the demands, foreseeing the necessities, advising and urging the proper improvements until his name as been, and always will be, indissolubly identified with the deeper channels, the improved facilities and the growth of commerce on the Great Lakes to whatever proportions these may in the future attain, and to him is due the gratitude of a nation, so signally benefited by the cheap water transportation afforded so largely by his aid.

To such a man the stupendous works at Sault Ste. Marie will be a fitting monument, serving in daily use and dependance upon them to remind the public of his great services.

His personal attributes of courtesy and affability, the graciousness and kindness of the man, endeared him to all who came in contact with him socially, or in his official relation, and he leaves behind the sweet savor of a good life, well-spent in the able discharge of important duties.

Resolved, That we express our deep sense of personal loss in the death of General Poe, and to his immediate Family we extend our sympathy; and

Resolved, That these resolutions be spread upon the records of The Lake Carriers' Association, and that a copy be sent by the Secretary to the Family of the deceased.

Harvey D. Goulder.
Thos. Wilson

B. L. Pennington
Geo. P. McKay

Committee.

A Vessel A Week.

The latent power of a maritime country lies in the private ship yards and engineering works at large within her borders. In this respect Great Britain still stands unrivalled. In the old wars, in the days of oak and hemp, England's yards enabled her to launch ship after ship; some, it is true, were not exactly "Hearts of Oak," for when oak ran short and time pressed, shift had to be made with less staunch material. Again, the many iron foundries enabled cannon to be cast throughout the land, and the power was not wanting to bore and finish them. Thus,by her recuperative power,England maintained her mastery of the sea. But in old days of sails, when it took perhaps twelve months to get around the world,wars were reckoned by as many years as now they would by months. The battleship has become so infinitely more intricate, such a vast and highly organized machine, that its construction can not be hastened as of old. Therefore, so far as the main body of the fleet is concerned,—in spite of the acceleration in dockyard construction of late—as a nation finds itself when war breaks out, so must it fight it out. This, however, does not apply to the smaller craft, the auxiliaries of the fleet, which are expected to perform so large a share in the work of destruction. Here the latent power will be made sensible.

A foretaste of what may be accomplished has lately been given by Messrs. J. & G. Thompson, at the Clydebank yard where the Paris, New York and many other renowned liners have been built, to say nothing of the Terrible, the first of the two largest cruisers ever constructed in England. Some time ago the Spanish government awoke all at once to the immediate necessity of quashing the Cuban insurrection, and, finding that they wanted light, quick vessels, searched the yards of Europe, only to learn that the market had been cleared by the South American republics in the settlement of their little differences. There being nothing available "in stock," proposals were invited for quick dispatch, and Clydebank undertook seven gunboats, to be turned out in three months, heavy penalties being recoverable for further delay. The contract was signed on July 11, 1895, but owing to the Glasgow fair holidays, which no Clyde artisan will miss, especially if his firm is exceptionally busy, a commencement was not made until July 22. The first vessel was launched on Aug. 24, and was ready to be taken over on Sept. 11. Others followed in quick succession, the last being completed ten days within the contract time, the entire period occupied for completing the seven vessels being just ten weeks—a little less than a vessel a week. The displacements of the vessels vary between 100 and 300 tons, and the speeds from 12 to 13 knots. The first vessel was 136 feet long, 26 feet wide and 11 feet draught. A yard that can turn out work in this fashion, in spite of having a big cruiser, a battleship and three torpedo boat destroyers in hand is, indeed, a source of strength to its country.

Another piece of smart work was executed by Messrs. Yarrow & Co. in turning out the stern wheel gunboats Mosquito and Herald for service in African rivers in the British service. England then had a little trouble looming up with Portugal. The order was given on the first day of April, and on the fifth of May following the trial trip took place, the construction having occupied just twenty-five working days. In the year 1893 the French government found it necessary to give the Dahomyans a lesson in a hurry. Wanting a shallow-draught gunboat for the purpose, they naturally first tried their own native builders, but no Frenchman would undertake to turn out a vessel under four months, some asking ten. They then applied to Messrs. Yarrow & Co., who considered that the thing could be done in a month. They booked the order, commenced work on April 28, and in twenty-three working days, or by May 23, the boat had made her trial. The vessel was 100 feet long by 18 feet wide, and like the two built for England, was made in portable sections which could be carried on a steamer and put together afloat. She steamed 10 miles an hour and carried 100 troops.—Cassier's Magazine.

Fuelling Agreement.

The committee empowered to act for the Lake Carriers' Association in the matter of fuel for steam vessels, met in Cleveland Wednesday and adopted the following agreement, which, it is expected, all members of the association will sign, and which means that during the coming season fuel will be purchased from hard coal dealers at Buffalo, but at no port shall the question of furnishing cargoes enter into the price of fuel, or the right of the vessel owner to purchase his fuel where he sees fit:

"This memorandum of agreement made as of the 12th day of February, 1896, witnesseth: We the undersigned owners, managers and agents of vessels on the great lakes do hereby agree each for himself and each to and with every other signer as follows:

WHEREAS, great abuses crept into the business of fuelling steamers, whereby certain shippers and dock managers required a steamer to obtain fuel in some particular place as a condition of the charter or in connection with furnishing or handling of cargoes, and certain shippers discriminated against consorts, which do not require fuel, unreasonable prices were charged and various extortions were practiced upon vessels and their owners in the matter of fuelling; and

WHEREAS, to meet these abuses in part many vessel owners last year refused to purchase fuel under any circumstances from the coal shipper by reason of the abuses referred to; now, in order to prevent any unfairness or injustice on either side we agree that during the season of 1896, our vessels shall obtain fuel wherever it mey seem to their best advantage, whether with the shipper of cargo or any other shipper, the manager of any dock, or from any fueling concern, or elsewhere, but this shall be upon the basis and conditions that shippers of coal whether at Buffalo or any other Lake Erie port, and whether of hard or soft coal, and every other shipper or manager of any dock, shall leave the vessel, her owner and master free to purchase fuel at any place the owner or master shall deem best for the interest of the vessel, and shall not make fuelling a condition of chartering or handling the vessel's cargo and shall not discriminate against consorts because of their not requiring fuel, or charge more than the usual market price taking into consideration the quality of the coal furnished.

"And for the purpose only of insuring absolute freedom of trade to all parties in the matter of fuelling, the undersigned owners agree that they and each of them shall refuse to deal at all in the matter of fuelling with any parties who shall attempt to abridge the right of the vessel to obtain fuel independently of any other consideration, and for that purpose we adopt as our committee the following, who were named at the Lake Carriers' meeting: James W. Millen, William S. Mack, John Rice, B. L. Pennington, M. A. Bradley, James Corrigan, David Vance, Thomas Wilson and George G. Hadley.

"We authorize this committee to appoint a sub-committee, of their own number if found more convenient, said committee being hereby invested with authority in our name and for us to adopt such proper measures as may be necessary in such case from time to time, each hereby agreeing to report at once to the chairman of the committee any such instance, and each of us agree to give directions to our agents and masters to do nothing directly or indirectly to defeat the purpose and intention of this agreement."

Around the Lakes.

Frank Rockefeller is the name selected for the steamer that is being built at West Superior for the American Steel Barge Co.

The steamer Neosho, which met with an accident last season and was sold as a wreck in Milwaukee, is now controlled by the Milwaukee Tug Boat Line.

Washington's birthday is the day selected for the launch of the big new Mutual line steamger—432 feet over all—at the ship yard of the Globe Iron Works Co., Cleveland.

Arthur Irwin is now corresponding secretary of the Thunder Bay association of marine engineers, No. 85, Alpena, Mich. His address is No. 427 Washington avenue.

Maricopa is the name selected for the steamer that is being built at South Chicago for the Minnesota Steamship Co. The two steel tow barges building at the same yard for the same company will be named Manda and Martha.

E. J. Kendall of Port Huron is engaged in the commendable work of endeavoring to establish a life saving station at that port. He is preparing petitions and other documents to be forwarded to Washington and if he succeeds he will deserve the congratulations of the shipping interests.

Recent vessel transfers at Chicago are: Schooner Horace Taber, Mrs. Antoinette Swenson to Peter W. Peterson, all, $1,000; schooner Lake Forest, W. D. Hitchcock to Chas. E. and Ervin P. Hinds, all, $5,500; schooner T. Y. Avery, M. A. Gunderson to John W. and Mannes J. Bonner, all, $800.

The London Times reports that 18,000,000 roubles have been appropriated by the Russian government for naval construction during 1896. The main object of Russia, according to the dispatch, is that for every new warship, especially of the cruiser class, which England shall add to her fleet, Russia shall produce one equally good or superior. The dispatch adds that seven vessels are now in course of construction for the Russian navy. Another dispatch says: "The czar has given his sanction to the naval estimates covering a period of seven years, beginning in 1896, when 57,500,000 roubles will be appropriated for naval purposes. This sum will be increased 500,000 roubles yearly. The figures are fixed in proportion to the amounts expended on their naval forces by other powers."

Capt. Nicoll Ludlow, U. S. N., who has been on duty as a member of the steel board in Washington, was a few days ago unexpectedly ordered to command of the monitor Monterey. Capt. Kane, who was in command of the Monterey, has been granted a leave of absence on account of sickness. It was thought that Capt. Ludlow was to be given the San Francisco, but this emergency order has probably changed things.

Need of a Firm Stand Among Vessel Owners.

In a letter to one of the Cleveland ore sales agents the president of one of the largest steel concerns in the country says that he thinks the ore dealers should now announce their prices. "Although not just ready myself to open up negotiations for the purchase of ore," he says, "I think that an announcement regarding prices from the ore men would have the effect of strengthening the entire iron situation." Within the past two or three days a few representatives of moderate purchasers of ore have visited Cleveland to talk over the situation. This would indicate that there is some cause for the ore dealers to consider the matter of announcing prices, which has been deferred in accordance with the plans of the ore combination to not make prices or attempt to force sales until conditions seemed to warrant such a move.

Now as to the vessel owners' side of the question. None of them are disposed to take ore at $1 from the head of Lake Superior. If they were ready to do so, they would very probably to-day find ore shippers willing to speculate somewhat on the outcome and take some tonnage at $1 from the head of the lakes or 90 cents from Marquette. These are the figures which the ore men have fixed in their minds, whatever may be the opinions of vessel owners to the contrary. Who will be a leader among the vessel men and effect an agreement among 60 per cent. of the tonnage to hold out for $1.10 or $1.15? Sixty per cent. of the tonnage, without any reference to vessels controlled in the offices of ore companies, could carry out such an undertaking. There seems to be necessity for such a move on account of the danger of the dollar rate being established through some owner less confident than his brethren being induced to accept some ore at that figure.

Duluth grain freights remain unchanged. Owners are asking 3¼ cents on wheat, first trips to Buffalo, and shippers are trying to get vessels at 3 or 3⅛ cents. Lumber dealers at the head of the lakes are offering $2 for first trips to Buffalo but are unwilling to make any contracts on conditions other than going rates, and this vessel owners are unwilling to accept.

Lake Vessels vs. Ten Trunk Lines.

Although in previous years lake vessels carried out of Chicago 58 to 63 per cent. of the entire shipments of freight eastward, such was not the case in 1895. High freights on iron ore and grain from the head of Lake Superior, as well as other coarse freight, attracted vessels to these lines of trade, and the grain business of Chicago was left largely to the railways. In the following table the business of ten trunk lines, running east from Chicago is compared with the business taken out of that city by lake vessels for five years past. The railways are the Wabash, Big Four, Michigan Central, Lake Shore, Fort Wayne, P. C. C. & St. L., B. & O., Grand Trunk, Nickel Plate and Chicago & Erie. The figures are from Chicago board of trade reports:

EAST BOUND SHIPMENTS OF FREIGHT OF ALL KINDS, LAKE AND RAIL, OUT OF CHICAGO DURING THE NAVIGATION SEASON, MAY TO NOVEMBER INCLUSIVE, FOR THE PAST FIVE YEARS.

Season of.	Moved by Lake.		Moved by Rail.		Total net tons.
	Amount, net tons.	Per cent.	Amount, net tons.	Per cent.	
1895	928,001	33.7	1,817,642	66.3	2,745,643
1894	570,584	62	348,333	38	918,917
1893	3,187,622	63.3	1,846,128	36.7	5,033,750
1892	3,052,014	58.7	2,145,180	41.3	5,197,194
1891	2,705,084	63.4	1,560,850	36.6	4,265,934

Appointments for Vessels Managed in the Office of Pickands, Mather & Co., Cleveland.

Minnesota Steamship Co., Cleveland: Steamers—Maricopa, Capt. G. B. Mallory, Engineer A Arnold; Mariposa, Capt. F. D. Root, Engineer F. A. Smith; Maritana, Capt. C. H. Bassett, Engineer Geo. Arnold; Masaba, Capt. F. Hoffman, Engineer A. L. Wilcox; Marina, Capt. J. W. Morgan, Engineer D. A. Black; Matoa, Capt. A. McFarland, Engineer W. Tyler; Maruba, Capt. A. H. Reed, Engineer B F. McCanna; Mariska, Capt. H. Zealand, Engineer P. Canton; Manola, Capt. H. C. McCallum, Engineer M. Jamieson. Schooners—Manda, Capt. Wm. Holly; Martha, Capt. F. J. Crowley; Malta, Capt. H. Culp; Marcia, Capt. E. L. Sawyer.

Huron Barge Co., Cleveland: Steamer—Pathfinder, Capt. W. B. McGregor, Engineer C. A. Heisner. Barge—Sagamore, Capt. John Weeks.

Interlake Co., Cleveland: Steamers—Victory, Capt. J. P. Cottrell, Engineer Wm. Densmore; Kearsarge, Capt. R. McDowell, Engineer P. P. June.

American Steel Barge Co., Cleveland: Steamers—Frank Rockefeller, Capt. John McArthur, Engineer Irwin Marshall; John B. Trevor, Capt. A. P. Chambers, Engineer Geo. Blauvelt; Thos. Wilson, Capt. M. A. Boyce, Engineer A. J. Smith; Samuel Mather, Capt. John Dunn, Engineer A. McKenzie; J. B. Colgate, Capt. W. H. Kilby, Engineer J. Hodgson Pierce; A. D. Thomson, Capt. Wm. Hoag, Engineer .....; E. B. Bartlett, Capt. R. Jones, Engineer W. Harsant; Colgate Hoyt, Capt. J. S. Parke, Enginear G. Patterson. The following masters have been appointed for the twenty-one tow barges of this company but assignments not yet made. Otis Holdridge, Geo. Gallant, F. E. Johnson, Louis Leonard, John Nahrsteet, Robt. Brooks, Samuel Wright, A. McArthur, Neil Campbell, Jas. Burr, John Sprowell, Geo. Trotter, E. Emanuelson, W. H. Dick, Jas. Leahy, M. C. Cameron, John Gillis, Wm. Holdridge, F. J. Cadotte, Chas. Grant.

OTHER APPOINTMENTS OF MASTERS AND ENGINEERS.

H. J. Webb & Co. Cleveland: Steamers—Samuel Mitchell, Capt. Thomas Wilford, Engineer James Clancy; J. H. Wade, Capt. C. M. Swartwood, Engineer Geo. Monagle; J. H. Devereux, Capt. Charles R. Cleveland, Engineer George B. Milne; Wm. Chisholm, Capt. Richard Call, Engineer Silas H. Hunter; Roumania, Capt. Lewis W. Stone, Engineer Martin Burns; Iroquois, Capt. Thomas Jones, Engineer Edw. W. Prince; J. H. Outhwaite, Capt. E. J. Burke; Engineer R. A. Davidson. Schooners—John J. Barlum, Capt. John McKeighan; H. A. Barr, Capt. Harry W. Phillips.

Great Northern Transit Co., Collingwood, Ont.: Steamers—Majestic, Capt. P. M. Campbell, Engineer W. Lewis; Pacific, Capt. R. D. Foote, Engineer J. B. Aston; Atlantic, Capt. James Wilson, Engineer J. Aston; Northern Belle, Capt. C. Jaques, Engineer S. Wilson.

Hopkins Steamship Co, St. Clair, Mich.: Steamer—Centurion, Capt. P. L. Millen, Engineer Charles Blauvelt.

Charles Blauvelt, who is to be chief engineer of the steamer Centurion during the coming season, brought out the whaleback passenger steamer Christopher Columbus and was chief engineer for the American Steel Barge Company. For a year or more past he has been in the steamer City of Everett in the Panama trade.

Charts of the Sault River—Sailing Directions.

New charts of St. Mary's river have finally been issued by the army engineer corps. They are excellent charts, and the care indicated in every detail of them is sufficient exuse for delay in getting them out. The river from the entrance to Mud lake clear up above point Iroquis is covered in two charts, one of which contains all ranges and all other essential features of Hay Lake channel. These charts may be had from the MARINE REVIEW, either upon application or by mail, at 35 cents each.

The last of the books of sailing directions for the lakes, covering Lakes Erie and Ontario, St. Clair and Detroit rivers and Lake St. Clair, has also been published by the hydrographic office. This book, which sells at $1, completes the series of sailing directions for the entire chain of lakes.

Horatio Davis of the Sewall & Day Cordage Co., writing Mr. J. W. Walton of the Upson-Walton Co., Cleveland, says: "We are in receipt of your most attractive bill of fare and wish we could have been with you at your glorious twenty-fifth anniversary. We should judge from the varied contents that you must have entertained your people from early morn until very late at night. We are pleased to note that the Sewall-Day brown bread was a great success, also that the ice cream, Fitler flavor, was the only article that did not go well. May you all live to have another celebration twenty-five years hence, and the writer will agree to be with you at that time."

The steel steamer which is being built in England for the Montreal Transportation Co. will be brought through the St. Lawrence canals to the lakes shortly after the opening of navigation next season. She will be named Rosemount and will be sailed by Capt. Archie McMaugh of St. Catherines. The new vessel is similar to the Bannockburn but of one foot more beam and a more modern ship. She will have triple expansion surface condensing engines, with cylinders 20½, 34 and 57 inches diameter by 39 inch stroke, and two boilers 13 feet 9 inches diameter by 9 feet 9 inches long, allowed 180 pounds steam pressure.

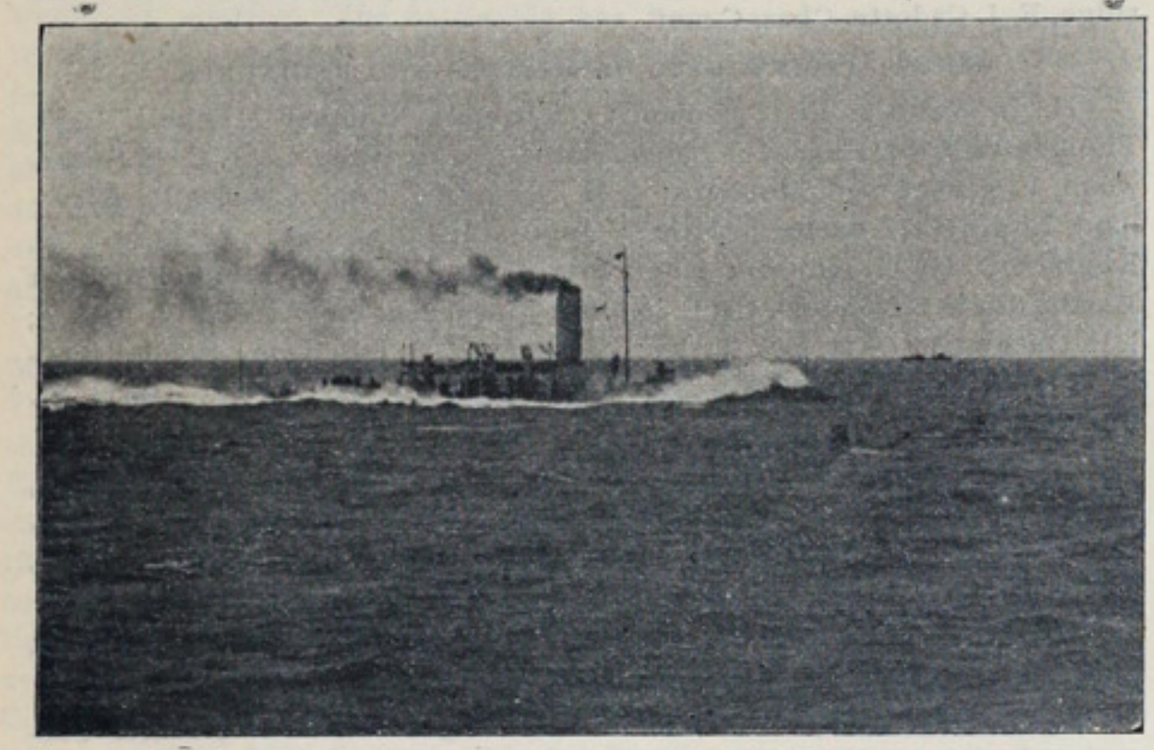
The new Hamburg-American line steamer, which is to have engines of 28,000 horse power, is to be fitted with vertical twin air pumps of the Blake type, similar to those furnished for the big cruisers built by the Cramps. It is something of a compliment to this American firm to be called upon to furnish pumps for a ship that will have greater power than any craft as yet afloat.

Pigiron production has dropped below the 200,000-ton mark and there is some accumulation of iron, but in ths latter respect January always presents an appearance that is worse than the true circumstances. The weekly capacity of the furnaces on Feb. 1 was 198,599 gross tons, against 207,481 tons on Jan. 1, 216,797 tons on Dec. 1 and 217,306 tons on Nov. 1.

Katahdin's Many Trials.

EFFORTS MADE TO OBTAIN 17 KNOTS WITH THE FAMOUS RAM—PROPELLERS USED—SOME DATA FROM OFFICIAL SOURCES.

The Katahdin is the latest addition to the United States navy, and although as regards speed she has failed to come up to the contract requirements, yet her efficiency as a ram is but slightly impaired. She needs no heavy armament, for she is her own weapon. Her destructive power is indicated by the following figures: At an ordinary cruising draft of 15 feet, and steaming at 16 knots speed, she will strike a blow of over



U. S. S. KATAHDIN ON OFFICIAL TRIAL—SPEED 11.16 KNOTS.

24,700 foot tons, a force capable of sinking any vessel that now floats. At 15 knots speed the blow would be about 21,700 foot tons and at 10 knots 9,660 foot tons.

The Katahdin's greatest forte lies in her strength as a body and the excellence of her model for maneuvering and offensive and defensive powers. The stem or ram proper is formed by a 14-ton casting, and massive girders and longitudinals converge to it from deck, keel and sides, well stiffened by breasthooks and intercostal frames and beams, so as to make all parts of the ship take the effect of the blow and insure no local weakness. The keel of the vessel is elliptical, and it is remarkable to see how rapidly she can turn and how quickly she answers her rudder, and this feature is absolutely necessary in a vessel intended for efficient harbor service. The bow and stern lines are remarkably full and hard and there is no deadwood or cutwater whatever. A sharp knuckle formed where the side and deck armor meet, about 8 inches under water, runs from the centre of the stem the whole length of the ship, and this will tend to rip out the side of a vessel struck. There are no important projections above deck with the exception of the coning tower, which weighs 45 tons and is 18 inches thick, and the smoke pipe and ventilators, which at the base have 6-inch inclined armor for about 3 feet high. The deck is convex and completely armored, and there are two strakes of side armor below water from 3 to 6 inches thick. Four 6-pound rapid fire guns are carried, two forward and two aft, in small barbettes as a protection against light torpedo craft.

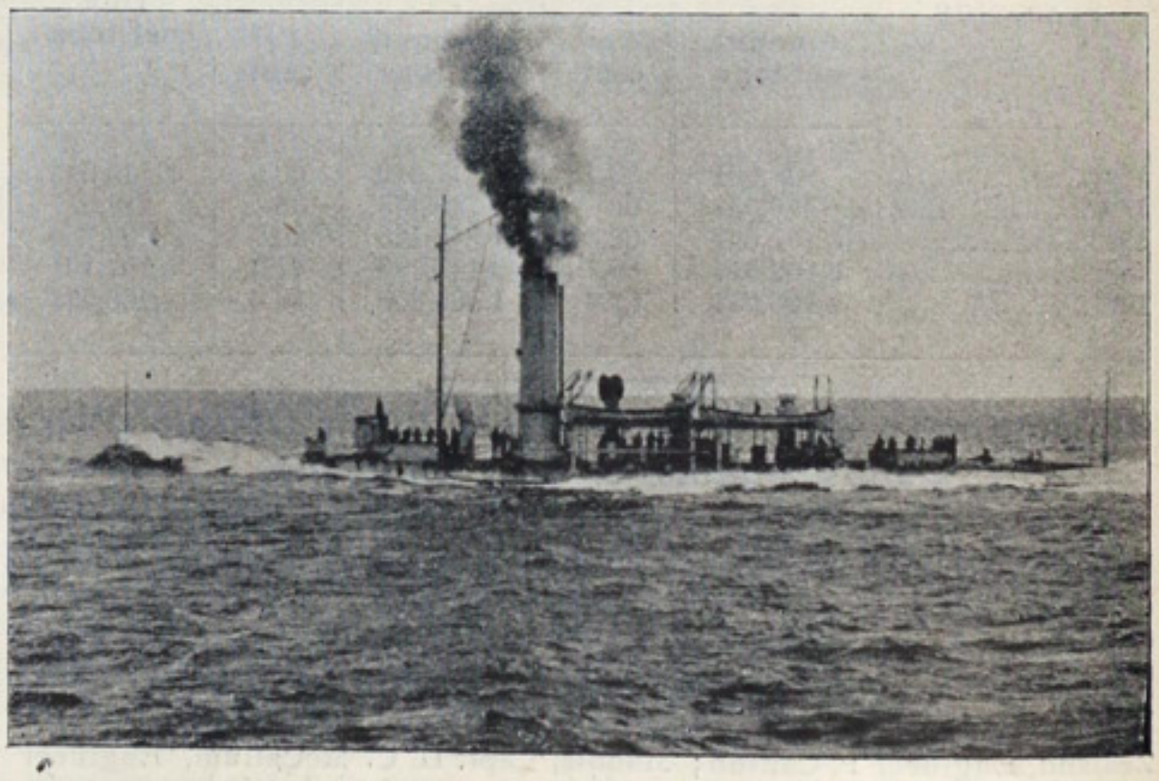
The dimensions of the vessel are well known, but it may be well to state here that she is 251 feet long over all, 43 feet 5 inches extreme beam and 15 feet mean draft; displacement 2,183 tons. The engines are twin-screw horizontal triple expansion, with cylinders 25, 36 and 56 inches diameter by 36 inches stroke, designed for 4,800 horse power at 150 revolutions. There are two double-ended and one single-ended Scotch boilers, with 12,160 square feet of heating surface and 354 square feet of grate surface.

On Dec. 10, 1894, the Katahdin made her first preliminary trial trip over a measured mile course off Southport, Me. The propeller wheels had a diamenter of 10 feet 6 inches, 15 feet 2 inches pitch and 30 square feet blade area. Her bottom was somewhat foul, and the engines not working satisfactory a speed of but 14.4 knots was attained with 2,440 indicated horse power, the slip being 27.4 per cent. The vessel was then taken to the Charleston navy yard and docked. New wheels of 10 feet 10 inches diameter, 14 feet 4 inches pitch and 38.5 square feet blade area were fitted, and late in March, 1895, the second speed trial was made. A speed of 15.71 knots was attained, with 4,124 indicated horse power and the slip was reduced to about 22 per cent. During April and May similar full power trials were made, the maximum speed obtained being 16.06 knots, with 5,749 indicated horse power and 27 per cent. slip, the power on this run being no less than 20 per cent. in excess of contract requirement, and yet the speed was one knot less. On May 31 a progressive trial from 8 knots upwards was decided upon, but after reaching a speed of 13 knots the bed plate of the after or starboard engine broke, and the vessel returned to Bath under one engine. It was not until Aug. 17 that the progressive trial could be concluded, the maximum indicated horse power developed being 5,059, which gave a speed of 15.86 knots and 25 per cent. slip. In the meantime a large cofferdam 40 feet long and 50 feet wide had been built by the Bath Iron Works, and when the Katahdin had completed her progressive trials with wheels No. 2, the stern was placed in the cofferdam and wheels of 12 feet diameter, 14 feet pitch and 36 square feet blade area were fitted. On Aug. 31 a progressive trial was made with these wheels and they showed considerable improvement over their predecessors. These screws had an inclined element aft of 15 inches in 56 inches, and were designed by the United States bureau of steam engineering from data received from the previous trials. The maximum speed was 16.07 knots, with 4,900 indicated horse power and a slip of but 16.7 per cent. The Bath Iron Works having worked out all the vessel's performances on a theoretical basis, then submitted them to the navy department, and the latter officials decided that all that could be done had already been done, and that the only course left was to run the vessel on her official trial and get all they could out of her.

This the builders decided to do, as they had already spent $40,000 in experimenting with her. She was accordingly taken to the Charleston navy yard and again docked. It was then discovered that one of the wheels had sprung somewhat, and the tips of the blades had been bent very badly by striking against the side of the ship. New wheels were therefore hurriedly cast, similar to the previous ones, but only 11 feet 10 inches diameter, and after having these fitted she left Boston and steamed to Long Island sound for her official speed trial. This trial took place in very unfavorable weather on Oct. 31, the result being that but 16.11 knots mean speed was attained with about 5,300 indicated horse power, or over 10 per cent. more than the contract specified.

It is undoubtedly the model of the Katahdin that is faulty, but Mr. William A. Fairburn of the Bath Iron Works, who has made all the caculations and curves of the vessel's performances during her speed tests, is confident that the speed could be increased from one-half to three-fourths of a knot per hour by moving the propellers much farther astern. A couple of struts and a new length of shafting would be necessary, but the total cost of the change would not exceed $5,000. The fact of having the propellers so far astern would certainly prove a slight detriment to the efficiency of the ship for harbor service, but this could be overcome to a great extent by building propeller guards that would project so far from the side of the vessel as to completely protect the wheels. This is done on most torpedo craft, and it should be remembered that the propellers as now located on the Katahdin project beyond the side of the ship and are unprotected. It is said that Chief Engineer Melville of the bureau of steam engineering has proposed to the secretary of the navy that the wheels be moved aft and if this proposition is approved it will be interesting to watch the result of this trial.

The Katahdin has made over fifty runs over the measured mile during her preliminary speed trials. For low speed up to about 13 knots the model is admirably adapted, and at 13 knots the admiralty displacement co-efficient of performance is 260. This good performance at low and medium speed is undoubtedly due to the small wetted surface of the vessel. At 15 knots the performance co-efficient has dropped to 165, and



U. S. S. KATAHDIN—FORCE EXPENDED IN WAVE MAKING.

at 16 knots it is but 135. All the propellers fitted have brought out about the same final results, and as slip was decreased so were revolutions and to a certain extent indicated horse power, and as regards the prime object—speed—the first wheels fitted were almost as satisfactory as the last ones. It is also a well known fact that the change in the wheels made just before the vessel went out on her official trial was not by any means beneficial to her.

Chicago Grain Freights—Other Matters.

Chicago, Ill., Feb. 12.—Dropping off an eighth of a cent at a time, corn to Buffalo is now at 2¼ cents. This is as low as it should be allowed to go. Shippers are not speculating at all in grain freights this winter, nor are they loading corn without having made sales for it. Now and then when they are able to sell a cargo, they take a boat, and that is all the business there is. There would not be anything more done at 1½ than at 2¼ cents, and shippers do not care, so long as the other fellow pays as much as they do, what the rate of freight is within bounds, for the grain is sold and the freight added to the price. Out of the big fleet which went into winter quarters here last December, but a small proportion has as yet been chartered, and there is danger of a semi-panic among vessel owners at the approach of spring to get grain into their boats, which may knock down rates to an unreasonable figure. This can be avoided, if vessel men will but remember that under present conditions lowering rates will not bring more business, and after they have cut freights by a quarter or half cent they are no nearer getting cargoes than before.

Local vessel men claim that the slow chartering is due to the sharp competition of New Orleans, which is taking vast quantities of corn from the southwest that under ordinary circumstances would come to Chicago. Receipts at New Orleans are running a half million bushels a day, far in excess of the grain business of that port during any previous winter.

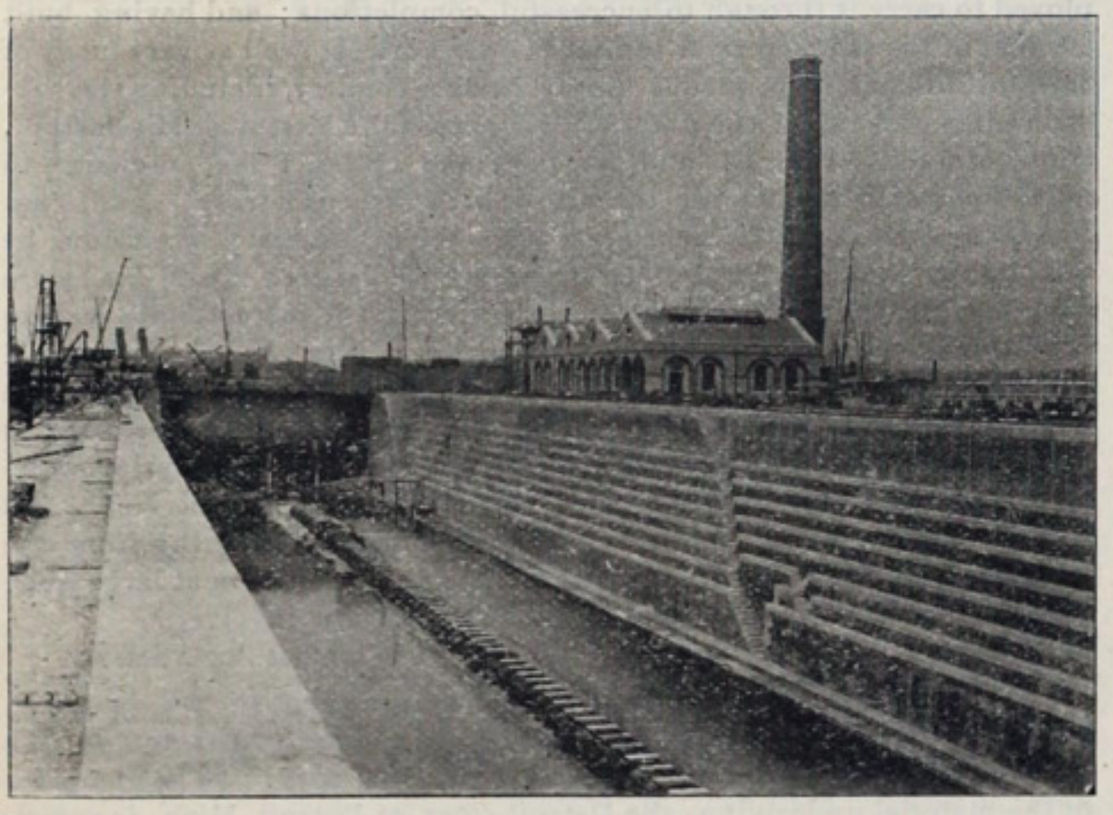
So far as can be learned at the present writing, none of the insurance companies doing business on the lakes will withdraw next season, nor will there be any additions to the list. General agencies will remain practically as they have been.

Andrew Crawford and Charles Counselman left for Washington Monday night to appear before the river and harbor committee of the house on behalf of an appropriation of $750,000 for deepening South Chicago harbor and the Calumet river, preparing for the 20-foot channel. The committee for Chicago river will also go to Washington this week. Its members will ask for $1,000,000 for the deepening and improvement of Chicago river. One newspaper correspondent telegraphed that Chicago is as likely to get a billion as she is to get a million in the present temper of congress, which is bent on economy before the presidential election. Nobody seriously believes that these appropriations will be made during the present session, but much is expected of the short session next winter after the November elections.

Boats in shelter under Whitefish point, Lake Superior, next season will be reported to the newspapers and owners, whenever near enough to shore to have their names made out. It is believed that this will be highly appreciated by vessel owners, who will then know the location of their boats during severe gales on Lake Superior, when they get under Whitefish point.

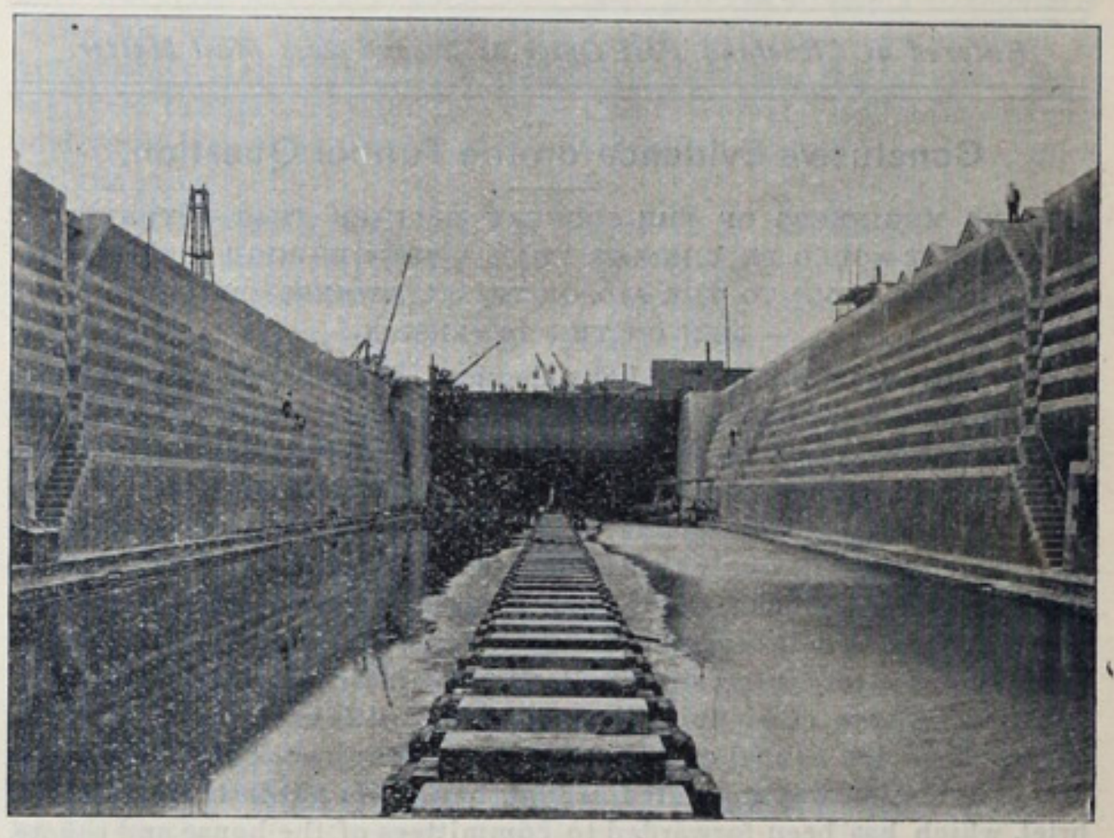
Great System of Docks.

Two views of the Prince of Wales dry dock at Southampton, England, the largest dock in the world, are presented on this page. A short description of this dock appeared in the REVIEW when it was dedicated some time ago, and when attention was directed to it through the dock-



VIEW OF PRINCE OF WALES DOCK, SOUTHAMPTON, ENGLAND, SHOWING BIG PUMPING STATION.

ing of the big American line steamer Paris. It is a part of the great system of docks, forming the terminals of the London & Southwestern Railway Co., which controls steamships and railway lines that connect with the Atlantic liners trading to Southampton. Twenty miles of tracks are within the dock yard used by this company, which operates the largest fleet of steamships of any British railway. These ships are used in the English channel service and in various other directions. Over 300,000 trains a year enter and leave this dock yard. In addition to six big docks, or slips as they would be called in this country, ranging in area from ten to twenty acres and having 23,572 feet frontage, there are four



VIEW OF PRINCE OF WALES DRY DOCK, SOUTHAMPTON, ENGLAND' SHOWING CAISSON AT ENTRANCE.

dry docks besides the big one here described. These are 250, 400, 450 and 500 feet in length and widths range from 50 to 80 feet.

The Prince of Wales dock was built in just two years. It is 750 feet long on the floor. Whenever required it can be extended 250 feet. It is 87 feet wide at the bottom, 112 feet wide at the top across altars, 87 feet 6 inches wide at entrance at bottom, 91 feet wide at coping level, and has 29 feet depth of water over the keel blocks at high water neap tides, and 32 feet 6 inches at high water spring tides. The total depth, coping to floor, is 42 feet. It is constructed mainly of Portland cement concrete, faced with the best blue bricks. The caisson stop and sluice faces are of Cornish granite, patent axed, and the altars and steps are of granite. The floor is paved with brindled bricks. The walls are founded 53 feet, and the bottom of the invert 59 feet below cope level. The capacity of the dock is 73,000 tons, with a maximum depth of 35 feet. At high water neaps it holds 14½ million gallons, which, with a ship inside, can be emptied in from one and a half to two hours by two immense pumps. These are capable of delivering 112,000 gallons per minute, discharging through two culverts 8 feet by 6 feet 9 inches. It can be filled in ninety minutes. All the valves and sluices are worked by hydraulic power. Provision has been made for additional hydraulic pumps, accumulator, etc. Steam is provided by four boilers, 30 feet by 7 feet 6 inches in diameter. Space has been left for two extra boilers. The chief feature in the construction of the pumping plant was the large excavation for pump foundations and well, a space nearly 90 feet square and 58 feet deep having been taken out and timbered in one piece. The wrought iron caisson closing the entrance to this dock is 93 feet long, 42 feet deep and 26 feet beam. It is of great strength and is used to carry a line of rails over which heavy trains pass in reaching other parts of the dock yard.

New Officers Among the Engineers.

Officers of Marine Engineers' Beneficial Association No. 96 of Houghton, Mich., recently elected, are: Past-president, Joseph Greenleaf; president, T. Brassau; vice president, Geo. Allie; secretary and treasurer, Joseph Greenleaf; conductor, C. F. Fisher; chaplain, Moses Herbert; door-keeper, M. O. Dellen.

M. E. B. A., No. 44, Manistee, Mich.: President, Allen McKee; vice-president, Christ Dahl; recording secretary, James Myers; corresponding secretary, Henry O'Connell; financial secretary, F. R. Winkel; treasurer, Richard Winkler; chaplain, H. F. Otto; conductor, Frank McMillen; doorkeeper, Racy March; outer doorkeeper, Adolph Winkel.

The Bath Iron Works, and especially Gen. T. W. Hyde and Supt. Charles R. Hanscom, are to be congratulated in having done so well with the ram Katahdin, the numerous trials of which are referred to in detail on another page, and in having finally got her off their hands. Although she came short of the required contract speed, she is a formidable vessel, and being somewhat of an "unknown quantity" she will strike terror into the hearts of our enemies. The designer of the hull of the vessel is Rear Admiral D. Ammen, U. S. N.

MARINE REVIEW

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

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Conclusive Evidence on the Tunnel Question.

LEADING ENGINEERS OF THE COUNTRY DECLARE THAT A TUNNEL AT DETROIT WOULD BE CHEAPER THAN A BRIDGE—HIGH AUTHORITIES COME TO THE AID OF VESSEL OWNERS—BRIDGE MEN ON THE DEFENSIVE.

Executive officers of the Lake Carriers' Association are now more hopeful than ever of their ability to defeat the efforts of the Michigan Central railroad to bridge the Detroit river. Leading engineers of the country, among them Gen. Wm. Sooy Smith, Professor Hiero B. Herr and L. E. Cooley of Chicago, as well as Geo. Y. Wisner of Detroit, have all declared unhesitatingly that a double track tunnel at Detroit can be constructed for a much smaller sum than the estimated cost of the proposed bridge. Their several communications, which are in part printed below, form a very interesting collection of information on the tunnel question. These communications, together with extracts of opinions advanced on the tunnel question by all army engineer boards, since the first commission was appointed in 1874, have been put into the form of a brief, which has been forwarded to committees of the house and senate, and to all senators and representatives specially interested in the contest between the vessel owners and railway interests. Mr. Cooley says he believes that a double-track tunnel can be built for less money and with lower grades and can be operated so as to avoid complaint, and that it will be more serviceable for the railway and will cost less for maintenance. "Responsible parties will," he adds, "build a double-track tunnel and approaches complete for $3,000,000 whenever the railroads are willing to contract for the same."

Mr. Wisner says that methods of tunnel construction have been perfected to such a degree that the success and cost of such work may be predicted with the same certainty as any other kind of engineering projects. "In 1867," he says, "James F. Joy, then president of the Michigan Central railroad, engaged the late E. S. Chesebrough to investigate the feasibility of constructing a tunnel under the Detroit river. A drainage tunnel 5 feet in diameter was commenced on line of the proposed larger tunnel in 1872, and after completing 1,220 feet on the American side and 450 feet on the Canadian side of the river, work was discontinued in 1873, the directors having come to the conclusion that the cost to complete the undertaking would be more than the business at that time would warrant them in expending. In 1890 the successful completion of the St. Clair tunnel at Port Huron opened up the way for the safe and economical construction of tunnels through soft material, and with the experience gained from that work, there is no doubt that a similar tunnel may be constructed for much less money at the present time. The total length of the St. Clair tunnel is 6,000 feet, 2,300 feet of which is under the St. Clair river. The maximum depth of the river on the line of the tunnel is 41 feet, at which point the thickness of the soft clay above top of tunnel is only 16 feet. The material through which the tunnel was constructed was soft clay with pockets of gravel and quicksand. Inflammable and explosive gas issuing from fissures in the clay added greatly to the dangers under which the work was executed. The total length of 6,000 feet was completed in about one year, or an average of about 16 feet of completed tunnel per day. The detailed cost of the tunnel and approaches, as furnished by Mr. Joseph Hobson, chief engineer, in 1890, was as follows: Expended on preliminary work, $250,000; machinery and plant used in construction, $250,000; labor of all kind, $900,000; cost of iron for lining, $800,000; other material, $100,000; real estate, land damages and legal expenses, $110,000; permanent equipment locomotives, etc., $50,000; approaches, $200,000; engineering, superintending, etc., $40,000; total cost of tunnel and approaches, $2,700,000. The length of the St. Clair tunnel is approximately the same as would be required for a tunnel at Detroit. The character of the material through which a tunnel under the Detroit river would have to be constructed is easier to work than at Port Huron, and it is perfectly safe to estimate that a similar tunnel may be constructed here for an amount not to exceed $2,000,000. This amount includes tunnel and approaches. The St. Clair tunnel has a capacity of 4,000 cars per day, an amount equal to about four times the capacity of the Michigan Central cars crossing the river at Detroit. An argument that has been largely used in favor of the construction of a bridge at Detroit is that it would result in the expenditure of $4,000,000 here. It should be remembered that a large portion of this amount will be for material, and will be expended elsewhere. And besides, of the amount expended for labor, one-half would be on the Canadian side. In the above statement of costs of the St. Clair tunnel, it will be seen that only $900,000 was expended for labor. In conclusion I wish to say that in my opinion a tunnel may be constructed under the river at Detroit for approximately two-thirds of that which a bridge would cost at the same place."

Gen. Sooy Smith's letter on the subject is in full as follows:

Harvey D. Goulder, Counsel Lake Carriers' Association—Sir: As there is no water channel on the continent of America which carries anything like the commerce which passes through the Detroit river, it is a matter of the very greatest interest to the Lake Carriers and to those whose property they transport, that this channel shall be free from every obstruction that may not be absolutely necessary. And while the great traffic that crosses the river at Detroit deserves and demands a tunnel or a bridge across the river at that point, careful investigation and consideration will inevitably lead to the conclusion that all the interests involved will be better served by a tunnel than by a bridge. And this for the following reasons:

A tunnel will furnish a safe and everlasting crossing, at a minimum cost, both for construction and maintenance. The level of tracks in the tunnel may be placed at 60 feet below the surface, and if the grade of the approaches is made 70 feet per mile, the approaches will be much shorter than those which would be required to reach the level of a bridge placed at 140 feet in the clear above water surface. And the tunnel approaches will be entirely underground, with the exception of about one-third of a mile at the inshore ends. The consequent land damages will thus be reduced to a minimum.

The portion of the Hudson river tunnel at New York last built was done by contract, at a cost to the tunnel company of $350 per lineal foot for each single track tunnel. And this, at a much greater depth than the one proposed at Detroit, and in very much worse material. But even supposing that a double track tunnel will cost $700 per lineal foot, and making an equally liberal estimate of the cost of approaches exclusive of land damages—it will be safe to say that a double track tunnel complete, including approaches, can be built under the Detroit river, at Detroit, at a cost that will not exceed $3,000,000. When the tunnel has been completed, it will require very little expenditure of money for maintenance. It will be warm in winter and cold in summer time. It may be well lighted and thoroughly ventilated, so that it will be comfortable and attractive, especially if smokeless locomotives are used.

The estimated cost of a bridge at the crossing proposed is said to be $4,000,000 for bridge and approaches complete, not including right of way and land damages, which will be very large. When completed, the expenditure for maintenance will be great. The painting alone of the bridge and trestle approaches will be a very large item. There can be no question that a tunnel will afford a much safer crossing than a bridge. Accidents in tunnels hardly ever occur, while they are frequent to bridges and trains passing over them. Even with the best of care, a bridge is a perishable structure. The tunnel can be built as quickly as the bridge, so that there can be no objection to it on account of the time required for its construction.

Having planned a tunnel under the river at Detroit, and studied all the difficulties involved in its construction, and consulted Mr. Chesebrough fully with regard to the undertaking, and the means to be employed to carry it through to successful completions; and having built 800 feet of the Hudson river tunnel at New York, as well as very many of the most difficult subaqueous works in this country, including the substructures of many of the great bridges across the Missouri, Mississippi, Ohio, Mobile, Savannah and Susquehanna rivers, I feel prepared to make the statements herein contained, with full confidence. And, I am happy to say that Mr. Chesebrough, after the preliminary work done by him, on the trial tunnel at Detroit, frequently assured me of his entire confidence in the practicability of constructing the main tunnel, stating that there were no threatening difficulties in the way. Believing as I certainly do, that a tunnel is in every way preferable to a bridge, I can not conceive what good reason the railroad companies that must furnish the means to build the crossing can have for building the inferior structure when the better one will surely cost at least 25 per cent. less. And if these companies fail to reach a right conclusion, reasoning from the standpoint of their own best interests, has not the nation at large some voice in the matter, when such great interests are involved?

Chicago, Ill., Feb. 12, 1896. WILLIAM SOOY SMITH.

Mr. Hiero B. Herr of Chicago, who was president of the American Society of Civil Engineers, and who is a leading contractor in this country for public works, breakwaters, piers, etc., says: "The character of the material underlying the Detroit river at Detroit, Mich., is sufficiently well known to make possible a near approximation in estimating the cost of a tunnel of any given dimensions at that locality. A rough estimate of the cost of a tunnel to carry a double track railroad, exclusive of the right of way, comes so far below the estimated cost ($4,000,000) of a bridge of like capacity that I can unhesitatingly say that the tunnel can be constructed for a smaller sum."

Acid vs. Basic Steel for Ship Construction.

Readers of the REVIEW will remember several articles that have appeared in these columns relative to the merits of Basic open-hearth and acid open-hearth steel for ship construction. One of these articles, which compared the Basic product unfavorably with acid steel, was copied in the Boiler Maker, a publication that is gotten out by Joseph T. Ryerson & Son of Chicago, dealers in high grades of iron and steel for railroads, boiler makers and workers in heavy sheet iron and steel. A. C. Cunningham, a well known engineer of Albany, N. Y., took exception to the article. He claimed, without apparent cause, however, that from the article one might infer that all acid open-hearth steel was superior to all Basic open-hearth, and that it was a question if Bessemer steel was not superior to the latter. "Such an inference would be entirely unjust and incorrect" he said. "There is plenty of good Basic open-hearth steel made today and plenty of poor acid open-hearth made also. One thing is certain: If acid open-hearth steel is made from low grade stock, high in phosphorus and sulphur, the resulting product is certain to be a steel of poor quality. A low grade stock which if used for the acid process, would produce a steel which was worthless, may when used in the Basic process produce a steel which is good, or even excellent. It is incorrect to make comparisons between the melting stock for acid and Basic steel; one might as well make comparisons between clay for bread and flour for bricks. A stock which will make good Basic steel may make worthless acid steel, and a stock which will make fair acid steel will make excellent Basic steel. That there is nothing fundamentally wrong with Basic steel is shown by the fact that some of the best grades of acid steel made depend upon Basic melting stock for their results. To secure a good steel of any kind it is necessary to have a specification which provides for steel, and such a specification must contain not only physical, but chemical requirements. The specification, alone, however, is not sufficient; it must be backed by physical and chemical tests, intelligently selected and made, and the authenticity of which is unquestionable."

The Chicago firm seems to have a leaning toward acid steel, although they represent, among other concerns, the Otis Steel Co. of Cleveland, manufacturers of Basic steel. They accordingly forwarded the above communication, with the article from the REVIEW, to a steel manufacturer whom they regard as an expert and one of the ablest metallurgists in this country. He requests that his name be not published, and this is unfortunate, as his letter, which follows, makes an interesting addition to the several that have been printed in the REVIEW:

"Mr. Cunningham says that 'one might infer that all acid open-hearth steel was superior to all Basic open-hearth, and that it was a question if Bessemer steel was not superior to the latter.' The writer of the article in the MARINE REVIEW did not intend that such inference should be drawn. That writer's frequent use of the word 'uniform' in connection with the acid processes clearly indicates that the inference he meant to be drawn by the reader is that acid steel is 'uniform' and that Basic steel is not 'uniform'; or, to put it in other words, is irregular and variable; some Basic steel is good, and some bad; 'numerous instances of peculiar defects resulting in fracture of steel, with apparently no sufficient causes,' indicate that Basic steel is unreliable and uncertain in use It is true that by acid methods low grade stock, high in phosporus and sulphur, is certain to make steel of poor quality; it is equally true that by acid methods high grade stock, low in phosphorus and sulphur, is certain to make a steel of good quality. Mr. Cunningham states: 'A low grade stock, which if used for the acid process, would produce a steel which was worthless, may when used in the Basic process produce a steel which is good, or even excellent.' It is probable the MARINE REVIEW writer would say in the last clause: 'May produce a steel apparently good or excellent; but there is an uncertainty as to whether it is really good or bad till it is actually in service for some time.'

"From the foregoing we see that steel by the acid process is certainly good or bad according as the stock from which it is made is good or bad; with the Basic process the result is uncertain. It is assumed that the metallurgical skill of the steel maker is the same in all cases. The acid process is comparatively simple; the Basic process complex. The acid process because of its greater simplicity ought to, and does produce steel more uniform and regular than the Basic process in its results in actual use. When all steels were made by acid processes the quantity of the phosphorus and sulphur therein gave a fair index of their quality; that is, the presence of those elements in greater or less quantities gave an unfailing indication as to the relative value and desirability of steels made by the same process. With Basic steels the case is different. Phosphorus and sulphur are no longer definite indices of quality in comparing steels made by this same process or in comparing them with steels made by the acid process. Steel made on the Basic hearth probably contains injurious elements or compounds, other than phosphorus and sulphur, not ordinarily determined by the chemist when when making analyses of steels. When these 'other' deleterious elements or compounds are recognized and are quantitatively determined by the chemist, the quality of Basic steel can be predicated from analysis of the steel itself; but from the nature of the Basic process, depending as it does upon numerous and varying reactions and conditions, which must be properly and promptly carried out and met, to successfully rescue the steel from 'the bad,' the quality of the resulting product can never be as certainly predicated from analyses of the stock from which the steel is to be made as in the case of acid steels. Briefly, the acid steel principally depends for quality and uniformity on the purity and regularity of the stock from which it is made; the Basic process attempts to regularly attain the same ends by complicated treatment and manipulation of heterogeneous and cheap stock after charging it into the furnace. Bearing these thoughts in mind it is clear that the greater uniformity of the acid steels is due the simpler and more direct characteristics of the stock and the process.

"The foregoing supports the statement of the MARINE REVIEW, 'that many prominent engineers who have made the subject a study prefer to use good Bessemer steel rather than Basic open-hearth, and that makers of Basic open-hearth steel must improve their methods before their steel can be accepted as equal to the best.' Railroads keeping careful records of the durability of their fire box steels in service have abandoned Basic and returned to acid steel, because of the greater reliability and regularity of the latter. They naturally had been attracted by the apparently superior chemical analyses and physical tests of the Basic steel, but later they found to their cost that those results were not true criteria of the value of fire-box steels when put to the severe and long continued test of actual service in the fire-box itself.

"All this is not an attempt to exalt acid steel at the expense of Basic steel. The endeavor is to present facts as they appear to exist to enable us to arrive at a true and well supported position as to the relative value of the two processes. Turning now to acid Bessemer steel. It is a popular fallacy that soft Bessemer steel is more irregular than open-hearth steel. Soft Bessemer steel suitable for ship plate, water pipe and standpipes is now made by some manufacturers, who make a specialty of soft steels, of remarkable regularity indicated by both chemical and physical tests, and proven by its durability in actual service.

"Now as to specifications: Specifications are not absolutely necessary to enable the consumer to get good steel from manufacturers of high and well established reputation Such manufacturers regularly test and inspect the material as it is rolled, to enable them to keep proper control of the manufacture and to inform themselves definitely as to the steel they ship. Most manufacturers prefer reasonable specifications, as they then know that they are without doubt furnishing the steel required by the buyer."

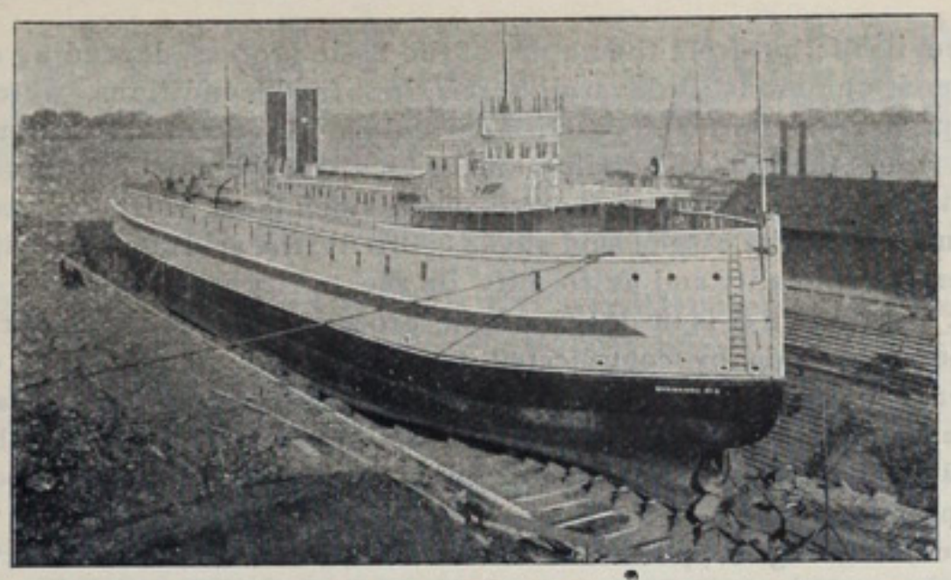
Trade Notes.

John B. Roach of Chester, Pa., has secured a contract to build two double-deck steel ferry boats for the Brooklyn & New York Ferry Co. They will each be 168 feet long, 36 feet 6 inches moulded beam, 62 feet over guards and 14 feet 6 inches depth amidships.

The Williams & Rodgers Co., Cleveland, is finding quite a large patronage from vessel owners who have occasion to furnish cabins of new vessels or to refurnish vessels already in commission, either freight or passenger. A large order taken by this firm recently was for refurnishing the Cleveland & Buffalo company's steamer State of New York.

The Graham-Meyer Torch and Liquid Light Co. of Boston has recently perfected a self-feeding torch to burn any length of time that may be desired. The devise is very ingenious and should prove of very great value on docks, at mines and for use at life saving stations, etc. Gas generated from kerosene oil is the illuminant used. It produces a most powerful light. By its aid a newspaper has been easily read at a distance from it of ninety yards on a very dark night.

The Berlin Iron Bridge Co. of East Berlin, Ct., has just completed a very successful year. Shipments have been the largest in the history of the company, representing over $1,500,000 worth of business. At the annual meeting of stockholders, held on Jan. 30, the following directors were elected: Chas. M. Jarvis, Burr K. Field, George H. Sage, H. H. Peck of Waterbury, S. H. Wilcox of Brooklyn, N. Y., J. W. Burr and F. L. Wilcox. These directors elected the following officers: President and chief engineer, Chas. M. Jarvis; vice-president, B. K. Field; secretary, Geo. H. Sage; treasurer, F. L. Wilcox; manager of highway bridge department, D. E. Bradley; assistant to the president, E. W. Stearns.



Shenango No. 2, 301 feet long, 51 feet beam.

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Metal and Wooden Ship Builders.

New Dry Dock—450 feet long, 110 feet wide on top,
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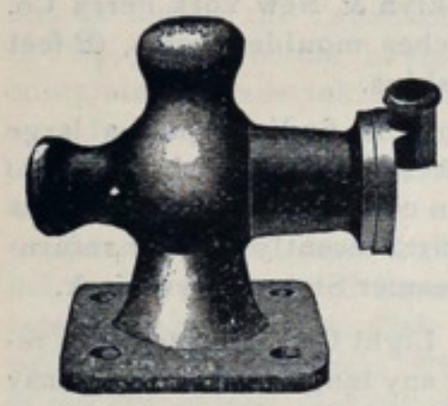

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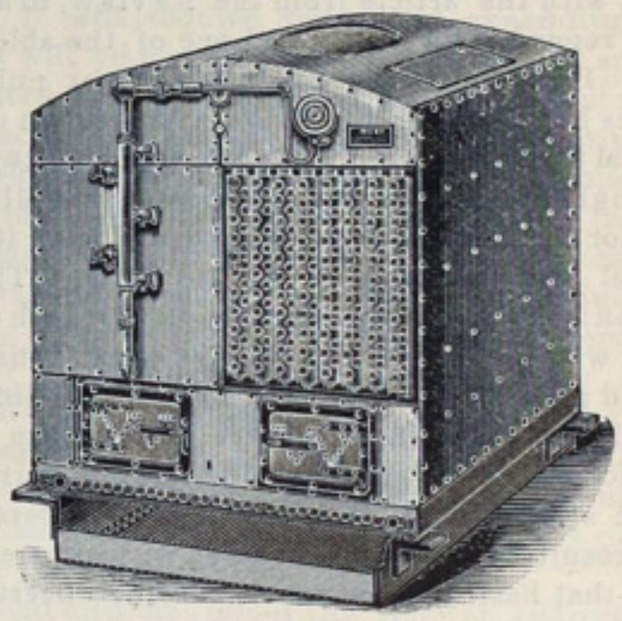

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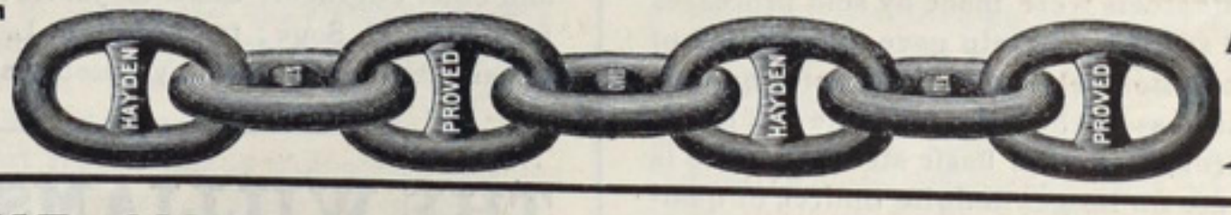

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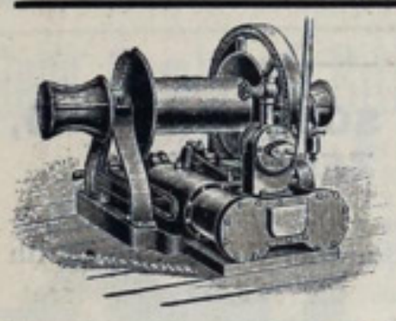

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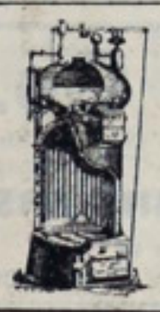

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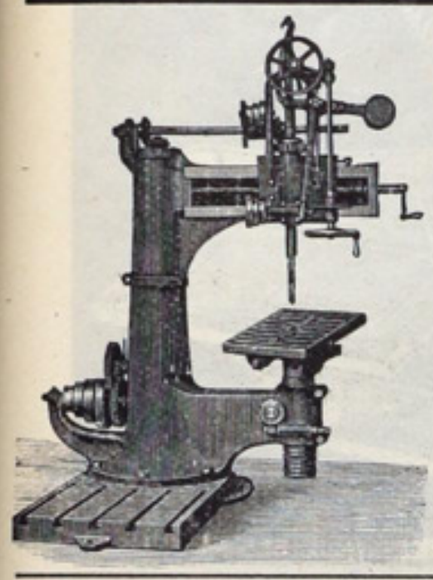

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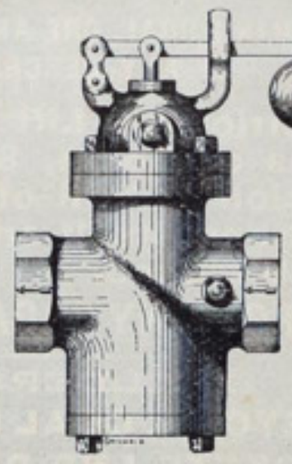

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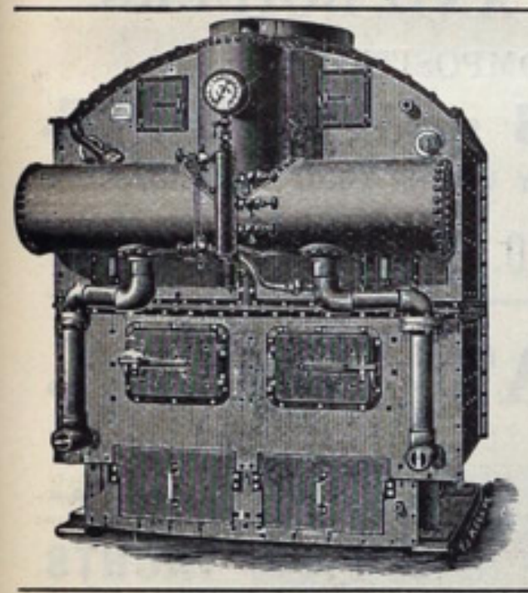

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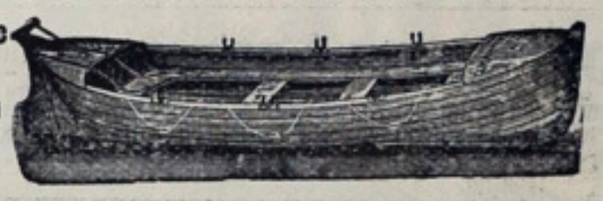

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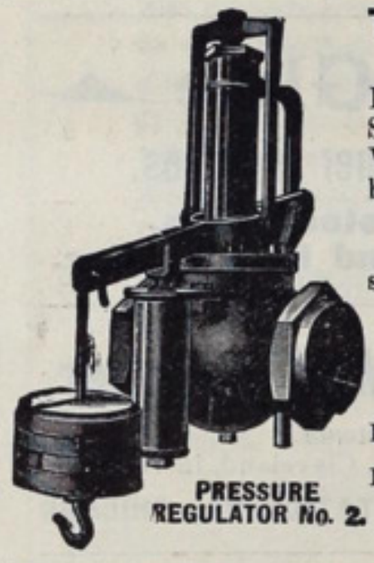

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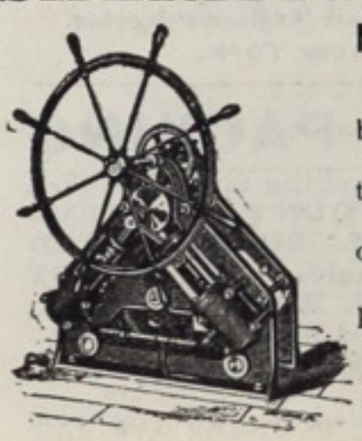

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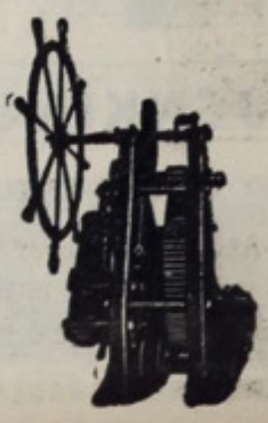

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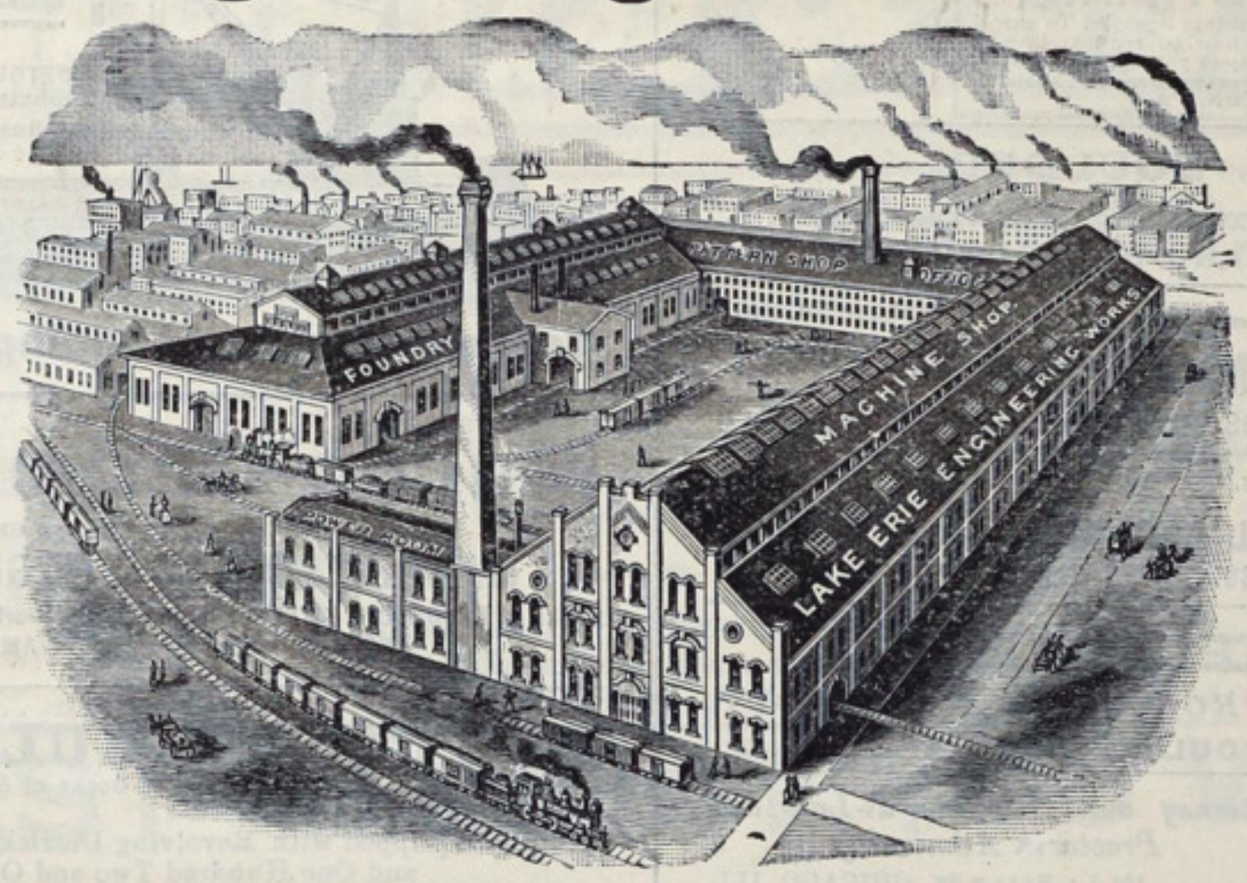

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